UNIVERSITY OF ILLINOIS

GRADUATE COLLEGE

DIGITAL COMPUTER LABORATORY

Report No. 129

A REPORT ON A SPECIAL SUMMER 1962 COMPUTER PROGRAM
FOR UNDERGRADUATES

by

L. D. Fosdick, C. W. Gear,
and N. Hamilton

October 9, 1962

SUMMARY

This is a report on a summer undergraduate program held at the
Digital Computer Laboratory during the summer of 1962, and supported by the
National Science Foundation. The aim of this program was to interest out-
standing undergraduates in computing and in pursuing graduate studies in
this field.

The ten undergraduates, from ten Universities in the United
States and Canada, who participated in this program attended seminars on
programming, numerical analysis, and computer design. They used the Illiac
extensively and worked on individual projects in computing.

This is the second year that this program has been offered, and,
although it is still too early to determine if the aims are being fulfilled
(the majority of students attending in 1961 will not graduate until 1963),
it is felt that it is worthwhile continuing the program.

Introduction

This report is a description of a special summer program on the use and construction of stored-program computers conducted by the Digital Computer Laboratory of the University of Illinois during the eight week period commencing June 18, 1962, and terminating August 10, 1962. The number of participants in this program was limited to ten undergraduates from colleges in the United States and Canada who had completed the sophomore or junior year, but had not completed the senior year. The program was arranged by Professor L. D. Fosdick, instruction was given by Professor L. D. Fosdick, W. J. Poppelbaum, and C. W. Gear of the Digital Computer Laboratory and Professor N. Hamilton of the Mathematics Department.

The object of this program was to generate an appreciation for and an interest in doing graduate work in the field of computers and computing among undergraduates. Furthermore, since it was hoped that we might draw some of our own future graduate students from the participants, this program gave us the opportunity to judge their abilities by direct contact.

The reader is referred to Digital Computer Laboratory Report No. 112 covering the program of 1961.

Selection of Participants

The first step in obtaining participants was to advertise the program. This was done by mailing a form letter to the chairmen of departments of mathematics at a number of schools which asked for nominations and with which was enclosed a brochure describing our laboratory and a poster announcing the summer program.

Attachment I to this report contains the list of schools contacted and copies of the form letter and poster sent.

This advertisement generated a number of requests for application forms which were then mailed, filled out, and returned to us. In addition to the completed application form at least three letters of recommendation

and a transcript of grades were requested. A sample application form is included as Attachment II to this report. We received fifty-one completed applications.

From these fifty-one applications a committee of three, Professors A. H. Taub, L. D. Fosdick and N. Hamilton, selected and ranked into three groups fifteen of these applicants. The basis for this selection and ranking consisted of the grades shown in the transcript, the letters of recommendation, and the statement written by the applicant on the application form. Previous computing experience by the applicant was not a factor in this selection.

Of the fifteen thus selected, the people in the top two groups of five were informed by letter on March 2 that they had been chosen as participants in our program. They were asked to indicate their acceptance by March 15, 1962. The five people in the other group were informed that they were alternates and the remaining applicants were told that they had not been accepted.

One additional person, who found out about the course on the date of application closure but who still applied was also chosen. Fortunately, one of the ten selected was unable to accept, thus keeping the number at ten.

Program

The program consisted in part of regularly scheduled seminars. One series, led for three weeks by Fosdick and then by Gear was devoted to programming and related topics; another, led by Poppelbaum, was devoted to logical design of computers; a third, led by Hamilton considered numberical methods and analysis.

In addition, one hour seminars were given on a variety of topics by members of this and other laboratories. These included:

Paul	Algol Translation-Algebra
Wiehle	Algol Translation-Addressing
Braunfeld	PLATO--a teaching machine project
Ray	Memories
Descloux	Error analysis

The regular seminars on programming met intensively for the first few weeks and they were devoted to details on programming the Illiac; these seminars met Monday thru Friday for about two hours each day.

After three weeks the number of lectures reduced to three a week and were devoted to other input-output devices, library programs, the New Illinois Computer, the IBM 7090 and the IBM 1401 in order to contrast and compare methods of programming and computer system design.

The seminars on computer construction met two days a week for three weeks, each meeting lasting two hours. The topics covered included Boolean algebra in logical circuits, logical building block circuits, use of reduction techniques for circuit simplification, computer building blocks, typical computer structure and mechanization of arithmetic.

Each participant worked on a problem. Six worked on a project supervised by Fosdick (and later by Gear), three worked on a project supervised by Hamilton and described in attachment IV. The tenth, Moore, worked on a problem of his own choosing concerned with the numerical solution of the quantum mechanical oscillator.

While several students wished that they had been warned ahead of time that they would work on such a project so that they could choose one for themselves, the difficulty with such an idea is that it is not possible for a student to judge the length of the job at the start of the course. If, as was true in this case, there is no staff member connected with the course who fully understands the difficulties that will be encountered, there is a danger that the project will not be completed in the time available. In this case, Moore finished the program but was unable to do much production.

However, it is felt that the increased motivation experienced by the student is worth this risk.

The six participants working for Fosdick were engaged in writing Illiac programs to perform computations on the statistical behavior of a system of interacting particles known as the Ising lattice, a model for ferro-magnetics, binary alloys, liquids and gases. These programs are to

be used to investigate possible refinements in similar computations described in the paper, "Computation of Order Parameters in an Ising Lattice by the Monte Carlo Method," by J. R. Ehrman, L. D. Fosdick and D. C. Handscomb, J. Math. Phys. $\underline{1}$, 547 (1960). These refinements include an alteration in the Monte Carlo sampling procedure and in the boundary conditions. During the summer these programs were completely written and checked, and some preliminary results were obtained. This fall they will be used to examine the effects of the refinements. The fact that these people, without previous programming experience, were able to complete these programs during the eight weeks demonstrates their outstanding abilities.

Observations and Recommendations

The following list summarizes our recommendations for this program:

a) The program should be repeated next summer;

b) The topics covered and format of presentation should remain the same, with minor exceptions cited below;

c) The number of participants (ten) and regular seminar leaders (three) should remain the same;

d) The program should be announced in a number of journals, including

> Communications of the ACM
> Notices of the AMS
> Journal of Pi Mu Epsilon
> Physics Today
> MAA Monthly

It should also be advertised to departments of Physics and Electrical Engineering as well as Mathematics.

e) An attempt should be made to "follow up" and find out what previous participants do after they graduate.

Comments on these recommendations follow.

The participants were asked to write to us and state their observations and recommendations about the program; the letters which have been received are included as Attachment V to this report. On the basis

of these letters and personal conversations with the participants it is felt that they thought the program to be very worthwhile and that it should be repeated.

It is still too early to tell if the program has fulfilled its aims. Of the ten students present in 1961, seven were sophomores and consequently will not graduate until 1963. The three who have graduated should be contacted to gather statistics on the success of the course.

It seems that the present arrangement of three regularly scheduled seminars on programming, numerical analysis, machine construction and design is satisfactory and should be continued. Because the background of the participants is varied the specific content of these seminars should be somewhat flexible so that it can be molded to fit the needs of the group. Although the slower people may suffer a little, the aim should be to keep the brightest people interested.

Next year there will be a problem of which computer to use. Contrary to the request in one letter to teach the IBM 7090 and FORTRAN, it is felt that it would be better initially to teach the New Illinois Computer with its unusual features so that they may begin to work on a problem, and then to introduce other computers such as the 7090 and 1401 as part of the discussions on system design.

It is considered worthwhile, in view of the remarks in some of the letters, to send out a suggested reading list on programming ahead of time. Those who wish can then start on the problems earlier, so that the programming seminar leader can give more time to those who are completely strange to computers.

A small number of participants is highly recommended. There does not seem to be any reason for changing the present number of ten participants. The arrangements of having three people to lead the three regular seminars is highly satisfactory and definitely should be continued.

Last year's recommendation that the method of payment be changed proved not to be possible owing to requirements of the University Administration.

Other Comments from Students

      The lack of continuity noted in some of the letters was due to personnel problems. Gear was not available for the first two weeks of the course and Fosdick kindly taught until then. Poppelbaum gave three weeks of lectures on logical design until he was due to leave for sabbatical. This is obviously a situation to be avoided if at all possible as it is difficult to provide a coherent transition from one seminar leader to another.

      The problem two students seemed to encounter with libraries could be overcome by getting all books on reserve in the computer library to which they have full access.

ATTACHMENT I

LIST OF SCHOOLS CONTACTED

FORM LETTER

POSTER

Institution	Location
Amherst College,	Amherst, Massachusetts
Antioch College,	Yellow Springs, Ohio
University of Arizona,	Tucson, Arizona
University of Arkansas,	Fayetteville, Arkansas
Bates College,	Lewiston, Maine
Bowdoin College,	Brunswick, Maine
Brandeis University,	Waltham 54, Massachusetts
Brown University,	Providence 12, Rhode Island.
California Institute of Technology,	Pasadena 4, California
University of California,	Berkeley 4, California
University of California,	Davis, California
University of California,	La Jolla, California
University of California,	Los Angeles 24, California
University of California,	Santa Barbard, California
Carleton College,	Northfield, Minnesota
Carnegie Institute of Technology,	Pittsburgh 13, Pennsylvania
Case Institute of Technology,	Cleveland, Ohio
University of Chicago,	Chicago 37, Illinois
University of Cincinnati,	Cincinnati 21, Ohio
City College,	New York 31, New York
Clark University,	Worchester, Massachusetts
Colby College,	Waterville, Maine
Colgate University,	Hamilton, New York
University of Colorado,	Boulder, Colorado
Columbia University,	New York 27, New York
Cornell College,	Mount Vernon, Iowa
Cornell University,	Ithaca, New York
Dartmouth College,	Hanover, New Hampshire
University of Delaware,	Neward, Delaware
De Pauw University,	Greencastle, Indiana
Drake University,	Des Moines 11, Iowa
Duke University,	Durham, North Carolina
Earlham college,	Richmond, Indiana
Florida State University,	Tallahassee, Florida
University of Florida,	Gainesville, Florida
George Washington University,	Washington 6, D.C.
Georgetown University,	Washington 7, D.C.
University of Georgia,	Athens, Georgia
Grinnell College,	Grinnell, Iowa
Hamilton College,	Clinton, New York

Institution	Location
Harvard University,	Cambridge 38, Massachusetts
Haverford College,	Haverford, Pennsylvania
Hunter College,	New York 21, New York
Illinois Institute of Technology,	Chicago 16, Illinois
University of Illinois,	Urbana, Illinois
Indiana University,	Bloomington, Indiana
Iowa State University,	Ames, Iowa
State University of Iowa,	Iowa City, Iowa
John Hopkins University,	Baltimore 18, Maryland
University of Kansas,	Lawrence, Kansas
University of Kentucky,	Lexington, Kentucky
Kenyon College,	Gambier, Ohio
Knox College,	Galesburg, Illinois
Lehigh University,	Bethlehem, Pennsylvania
Louisiana State University,	Baton Rouge, Louisiana
McGill University,	Montreal 2, Quebec
University of Maine,	Orono, Maine
University of Manitoba,	Winnipeg, Manitoba
Marquette University,	Milwaukee 3, Wisconsin
University of Maryland,	College Park, Maryland
Massachusetts Institute of Technology,	Cambridge 39, Massachusetts
Miami University,	Oxford, Ohio
Michigan State University,	East Lansing, Michigan
University of Michigan,	Ann Arbor, Michigan
Millikin University,	Decatur, Illinois
University of Minnesota,	Minneapolis 14, Minnesota
University of Minnesota Inst. of Tech.,	Minneapolis 14, Minnesota
University of Montreal,	Montreal, Quebec
University of Nebraska,	Lincoln 2, Nebraska
University of New Mexico,	Albuquerque, New Mexico
New York University	
Washington Square College,	New York 3, New York
University Heights Campus,	New York 53, New York
University of North Carolina,	Chapel Hill, North Carolina
Northwestern University,	Evanston, Illinois
University of Notre Dame,	Notre Dame, Indiana
Oberlin College,	Oberlin, Ohio
Ohio State University,	Columbus, Ohio
University of Oklahoma,	Norman, Oklahoma
University of Oregon,	Eugene, Oregon

Institution	Location
University of Pennsylvania,	Philadelphia 4, Pennsylvania
University of Pittsburgh,	Pittsburgh 13, Pennsylvania
Princeton University,	Princeton, New Jersey
Purdue University,	Lafayette, Indiana
Queens College,	Flushing 67, New York
Radcliffe College,	Cambridge 38, Massachusetts
Reed College,	Portland 2, Oregon
University of Rochester,	Rochester 3, New York
Roosevelt University,	Chicago 5, Illinois
Rutgers University College,	New Brunswick, New Jersey
Smith College,	Northampton, Massachusetts
Stanford University,	Stanford, California
Swarthmore College,	Swarthmore, Pennsylvania
University of Texas,	Austin 12, Texas
University of Toronto,	Toronto, Ontario
University of Utah,	Salt Lake City 1, Utah
Vanderbilt University,	Nashville 5, Tennessee
Vassar College,	Poughkeepsie, New York
Washington State University,	Pullman, Washington
Washington University,	St. Louis 30, Missouri
University of Washington,	Seattle 5, Washington
Wayne State University,	Detroit 2, Michigan
Whitman College,	Walla Walla, Washington
Williams College,	Williamstown, Massachusetts
University of Wisconsin,	Madison 6, Wisconsin
Worchester Polytechnic Institute,	Worchester 2, Massachusetts
Yale University,	New Haven, Connecticut

I am writing to ask you to nominate undergraduate students who would be interested in being considered for the program described in the enclosed announcement. We plan to take at most ten students and therefore suggest that you recommend that only very promising students apply. Previous experience with digital computers is not required. We shall give preference to those students who are considering going on to graduate school. We do not expect any applicant to promise to go on to graduate study at the University of Illinois.

Our purpose in continuing this program is to stimulate interest in the study of the design and use of computers among future graduate students. We feel that this purpose will be met if a group of promising young people who are likely to go on to do graduate work are brought together for eight weeks and subjected to a training and working program.

The enclosed brochure describing the Digital Computer Laboratory may be of interest to you and some of the students you may consider for nomination.

Thank you for your trouble.

Sincerely yours,

A. H. Taub
Acting Head

AHT/hc
Encls.: Brochures,
Posters

UNIVERSITY OF ILLINOIS

DIGITAL COMPUTER LABORATORY

APPLICATION FOR UNDERGRADUATE SUMMER STUDY PROGRAM

NAME IN FULL
(do not use initials)
Mr.
Miss_____
Mrs.

Mailing Address_____
(Street)

_____
(City)   (State)

Home Address_____
(Street)

_____
(City)   (State)

Place of birth_____Date of birth_____

Country of which you are a citizen_____

Marital status_____ Number of children_____ Other dependents_____

Physical defects, if any_____

ACADEMIC TRAINING: (Give names of all junior colleges, colleges, universities, graduate, and professional schools at which credit has been earned.)

Institution and Dates Attended	Major and Minor Fields	Degree and Date

EXPERIENCE: (Teaching, research, professional, business, military, etc. Account for all of your time since the beginning of your undergraduate work up to the present other than time spent in academic training.)

Institution or Organization	Dates	Nature of Work

MEMBERSHIP IN HONOR SOCIETIES AND IN LEARNED AND PROFESSIONAL ORGANIZATIONS:

SCHOLARSHIPS, PRIZES, HONORS, OR OTHER RECOGNITION:

(72099)

FOREIGN LANGUAGES:

What languages other than English do you speak?_____

Read?_____

Recommendations. Four recommendation forms are enclosed. These should be given to persons who are well acquainted with your educational background, intellectual abilities, and personal character. List the names and addresses of those to whom you have given the recommendation forms. *An application will not be considered unless there are at least three recommendations on file by the deadline date.*

_____

_____

_____

Insert below a statement of not more than three hundred words concerning your past work in your proposed or allied fields of study, including non-course educational experiences, teaching or other relevant employment, publications, and your plans for graduate study and a professional career.

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_____

ARE YOU RELATED, BY BLOOD OR MARRIAGE, TO ANY MEMBER OF THE BOARD OF TRUSTEES, FACULTY OR STAFF OF THE UNIVERSITY OF ILLINOIS?_____ If so, indicate relationship _____

I have read the instructions for filing an application and I certify that the above statements are correct and complete.

SIGNATURE_____ **DATE**_____

(76205)

ATTACHMENT III

List of Participants 1962

Archer, Myla M.	Knox College
Erickson, Roy V.	Whitman College (Washington state)
Goldstine, Jonathan	Swarthmore College
Greenfield, Stephen J.	Columbia College
Grosshans, Frank D.	University of Illinois (Urbana)
Kopell, Nancy	Cornell University
Moore, Fergus E.	University of Colorado
Sebastian, Richard L.	Princeton University
Wagoner, Mary C.	Purdue University
Yang, H. C. Y.	University of Illinois (Urbana)

Report of Norman T. Hamilton

During the summer of 1962 it was my privilege to assist in directing the activities of the program in computing for undergraduates supported by NSF at the University of Illinois. My contributions to the program were:

1) to conduct a class in numerical analysis and related topics

2) to direct a group of several of the participants in a special research project.

Concerning 1) above: topics considered included asymptotic expansions, the Euler-Maclaurin sum formula, location of roots of polynomials, numerical solution of ordinary differential equations, stability of methods, use of generating functions, plane crystallography. At the beginning of the summer the class was conducted daily. Later, as the students' individual projects absorbed more and more of their time the schedule of classes was curtailed.

Concerning 2) above: during the first week I met several times with the group and discussed several possible topics for special projects of a mathematical nature. (Professor Fosdick conducted similar sessions concerning projects related to the physical sciences.) Only one attracted interest. Archer, Goldstein and Greenfield cooperated in investigating the values of the Riemann zeta function at odd integers. Over 400 denominators of the continued fraction of $\frac{\zeta(3)}{\pi^3}$ were calculated by us in the hope that some regularity might appear. In fact the distribution of the denominators turned out to be as one would expect from a "random" number.

I should like to add that one of my motives in working for the program was to educate myself in the field of high speed computing. As a result I spent a large amount of time at the laboratory and had a great deal of informal contact with the students and to a large extent shared

in their agonies and achievements. A great deal of the credit for the success of the program must go to the entire staff at the ILLIAC who never failed to assist us in every possible way.

The basic purpose of the program was to attract promising students to computing. A number of the students expressed determination at the end of the summer to continue to study the field. So I consider the program a definite success and hope that such programs may again be undertaken in the future.

Finally, I have never had a more rewarding association with a group of students during my career.

ATTACHMENT V

LETTERS FROM PARTICIPANTS IN THE SUMMER PROGRAM

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C
 O                                              1435 Devon Avenue
  P                                             Park Ridge
   Y                                            Illinois
                                                August 29, 1962
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Drs. Fosdick, Gear, Poppelbaum and Hamilton
Digital Computer Laboratory
University of Illinois
Urbana, Illinois

Dear Sirs:

Having received the money for my travel to and
from Urbana, I feel guilty enough to finally force me to
write the letter you requested. Although I suppose
criticism of the program would be of more help to you
in future summers, nevertheless, first I must say, that
your handling of these 8 weeks was excellent and far
exceeded my fondest expectations. Two particulars come
immediately to mind: first of all (and though to you,
this may seem trivial, to me it was important), everyone
in the laboratory, from secretaries to machine operators,
was very kind to us and helpful; secondly, at all stages
of the program, we were treated like adults and given a
great deal of independence--this, too, was deeply
appreciated. One should also thank you for arranging
special lectures, giving us high priority, providing us
with huge quantities of reading material, ad infinitum,
but, I think, these fall into the two notes above.

In criticism, I have very little to say. We
were, of course, sorry to have Dr. Fosdick and Dr. Poppel-
baum leave us. I, for one, enjoyed our series of 294
lectures very much and was sorry to see them terminated
(although, later on, the extra time was very much needed).
Since I was working on Professor Fosdick's project, I must
admit that there were several times that we would have
used his help--although concerning this project and
programming in general Messrs. Gear and Hamilton provided
us with a great deal of help.

Finally, once again, thanks very much to each
of you for the roles you played in making this a very
profitable and delightful summer.

                                        Sincerely yours,

                                        Frank Grosshans /s/

23815 Edmonds Way
Edmonds
Washington

Digital Computer Laboratory
University of Illinois
Urbana, Illinois

SUBJECT: Evaluation of Math 001

      For an evaluation to be valid, it must take
note of not only the good points but also the bad points.
To this end I would state the following: The overall
coverage of the computer and its operation; that is, the
programming logical circuitry, and applied mathematics
necessary for programming made this course very complete.
And it was this completeness that made it enjoyable for
me. Rather than merely learning how to add, we learned
how it is possible to add and also new ways to add: this
is a necessity for anyone aspiring to be a mathematician.
This, as well as the introduction to other types of
equipment and other uses for computers made the summer
very worthwhile.

      Further, the idea of a project on which to
work was a good one. This gave us practical experience
in programming as well as an introduction to some of the
ways in which computers may be applied to the physical
sciences. However, it is here that I would like to
recommend a slight change. I feel that there should be
a few small but valuable projects available for those
who complete their projects early and are unable to
dream up a new one on their own. This very fact caused
me to waste three weeks of computer experience, for try
as I would I was unable to arrive at a task of value
and of about three weeks duration. This caused no small
amount of frustration. But the period was not entirely
lost for I was able to read on a number of mathematical
subjects which were of interest to me; I even read a
little philosophy. All this was fine, but I would have
preferred programming since such facilities are not
often available. All in all, however, the experience
was very valuable and I thank you for it.

                        Sincerely yours,

                        Roy V. Erickson /s/

                        Roy V. Erickson

September 6, 1962

Mrs. Anna Ferris
Digital Computer Laboratory
University of Illinois
Urbana, Illinois

Dear Mrs. Ferris:

The summer Course in digital computers was an excellent idea that was well carried out. I enjoyed the complete freedom of the program, and appreciated being able to work at my own pace. There were always sufficient faculty and D.C.L. staff to answer, with infinite patience, questions that arose while working; I found this more valuable than the scheduled class lectures.

The special lectures, given by experts, on compilers, Plato, etc., were usually very good. The regular class periods, however, suffered a little from a lack of unity and direction. Because the program was still new, the staff members were unsure of what material to present. In mathematics, especially, there was often little logical connection between the material discussed and the projects we were working on, or even with computers in general. For the future, I would suggest that more class emphasis be placed on machine design, and less on the details of programming; after the first two or three weeks, most of what we learned about programming came from working and informal questioning. Dr. Poppelbaum's course might be extended; there was much more interesting material than could be covered in three weeks.

If possible, the staff should suggest a larger number of projects on which the students could work. The student who has his own pet project is rare; for the most part, we knew too little about computers to know what they are capable of doing. It is difficult for us to find a project that is both significant and feasible. Knowing the background of each student, a faculty member is in a much better position to suggest a meaningful project.

The facilities open to us in the laboratory were more than adequate, and we were given a very generous amount of machine time. Some of us, though, were hindered this summer by our undergraduate status, which restricted our library privilages. Would it be possible to give graduate status to the future members?

The eight weeks went by very quickly. For some of us, a lot of time was spent learning the rudiments of the trade, which can be done in the absence of the Illiac, et.al. I was able to procure a copy of Dr. Fosdick's excellent manual, which I studied a little before I came to the University; this helped me make better use of the time that I had. Perhaps the future members would appreciate being sent, in advance, a manual for the machine on which they will be working.

Despite my few criticisms and suggestions, I found this summer a very valuable experience. Thank you.

Sincerely,

Nancy Kopell /s/

Nancy Kopell

Enclosures

September 13, 1962

Dear Sirs:

You asked me to write a letter giving my comments on the summer digital computer program. I want to say I enjoyed the program and the informal atmosphere very much, and I think I have learned a lot more than I would have by taking regular courses. There are some things which I think might have been better.

If the same persons in charge of the program had been able to stay with us throughout the summer, the material we covered would have probably been more integrated, and we could probably have covered more ground, especially on the logical design of the computer. It would also have helped if the theoretical mathematics lectures had been better planned ahead of time and connected more closely with the rest of the lectures.

I think a greater choice of projects and more chance for an individual projects would have helped me, at least. Because I lived at home, I found it hard to keep track of what was going on in my group.

I want to say again that I am very glad to have been in the program this summer.

Sincerely,

Myla Archer /s/

Swarthmore College
Swarthmore, Pennsylvania
September 15, 1962

Mr. C. W. Gear
University of Illinois
Digital Computer Laboratory
Urbana, Illinois

Dear Mr. Gear:

There is very little critical that I can say about the Summer Program in Computing. I had one of the most interesting and constructive summers I have ever spent this summer at the University. I found the idea of learning programming as quickly as possible and then working on a project especially valuable. Applying programming skills and various mathematical techniques to problems as they came up during the project was far more interesting than the more routine programming done by Math 295.

I would suggest, however, that the programming lectures, while good, were not quite as useful as they might have been. Professor Fosdick's programming manual is so complete and clearly written that his lectures, often covering the same ground, seemed almost unnecessary. Your own lectures I found fascinating when you touched on such subjects as information theory and variable order length. The material on the 7090 order code, though interesting, I found less valuable since I felt that it was mostly in the IBM manuals, that we would pick it up rather quickly if we ever had an opportunity to program the 7090 but would forget it rather quickly otherwise.

The only other suggestion that I can make--and I know that this may be impractical--is that it would be useful to have a chance to do some programming for an IBM computer also. By and large, the only opportunity for us to gain further programming experience before graduation is by working for a company which uses or makes commercial computers, and so programming for a commercial machine would be a valuable experience.

In fact, the Summer Program was, as far as I am concerned, so successful that I am considering the computer field as a possible career. However, before deciding on anything as serious as a graduate career, I should want to gain further computer experience. Should you learn of any such opportunities--at the University or elsewhere-- for next summer, you would be doing me a very great favor if you let me know of them.

Thank you for a wonderful summer. (And good luck with Illiac II.)

Sincerely,

Jonathan Goldstine /s/

Jonathan Goldstine

C
  O
   P
    Y

Dr. C. W. Gear
University of Illinois
Digital Computer Laboratory
Urbana, Illinois

Dear Dr. Gear:

     I have just received your letter asking for my critique of
the Summer Program in Computing. I am sorry to have inconvenienced you
with my procrastination.

     I think that the program in general was excellent and should be
definitely continued. However, there are a few improvements that can be made.

     Firstly, I believe that the programming should be taught for a
machine which is in general use in other parts of the country. I realize
that this was impossible this last summer since the laboratory was only
starting its transition to the 7090. However, if next summer the 7090
is used as the machine to be programmed by the students; I believe you
will have a real improvement in the course. Using the 7090 system will
not make it necessary for students, in many instances to learn another
order code and its idiosyncracies, which I admit is not a very difficult
task. Also students could use the summer to start a larger programming
projects that would last into the school year itself if they have a 709
or 7090 at their own respective schools.

     Secondly, you should spend more time describing Fortran pro-
gramming with a few comments about Algol rather than vice versa as was
done this summer. I believe this should be done since I do not know of
any Algol compilers which exist in this country at the present time.

     Third, I think that the students should be given graduate library
privileges. Many of us ran into this problem since we were registered as
undergraduates, but were doing research on an upper-graduate level. For
instance, in the mathematics library one must obtain special permission
of the librarian to enter the stacks, if one is an undergraduate. In the
physics library one may not check out periodicals or obtain photocopies of
library materials unless he is a graduate student. In order to circumvent
these encumbrances one must do a lot of fast talking or obtain a graduate
student's or professor's assistance.

     Fourth, I think that it would be wise to inform the students
at the time of their acceptance into the course that they will be required
to do a programming project. This will allow the student many weeks to
think about a project they might like to do. A list of suggested topics
might help inspire some ideas of their own. This will eliminate the

situation that occurred this last summer. Namely, the students did
not know what they wanted to do, but finally, reluctantly accepted the
two topics that were suggested in class. I did consider myself lucky
in this respect, since I did think about subjects for programming and
was given some suggestions before I arrived at Urbana. Thus I was
prepared to submit my prospective subject immediately. I was the only
student in this situation this last summer; in fact, many of the group
came to me for suggestions. But I was unable to come up with anything
they liked, since my problems involved physics. I believe that a large
list (perhaps twenty or thirty topics) of a wide range of suggested
topics for programming should be sent to the students at least 6 weeks
before the summer begins. This would improve the summer for most of the
students vastly.

        With the above suggestions incorporated in your course, I
believe that the course should produce better and more satisfying
results.

        I would like to wish the computer laboratory continued success
in this summer program, as I believe firmly in this type of program and
would not like to see it discontinued.

                              Sincerely,

                              Fergus E. Moore /s/

                              Fergus E. Moore

222 1937 Hall
Princeton University
Princeton, New Jersey
September 22, 1962

Dr. C. W. Gear
Digital Computer Laboratory
University of Illinois
Urbana, Illinois

Dear Dr. Gear:

In evaluating the Summer Program I will speak
of factors which affected me, recognizing that many people
of differing interests and preparation were involved and
that it would be impossible to suit everyone.

While being constantly overloaded with work at
Princeton, it has always been my dream to study unharassed
by exams and on-campus jobs, also to study with more
freedom to look into what interested me. The Summer
Program certainly gave me everything I wanted in this
direction. In fact, it caught me a bit unprepared for
so much liberty. Perhaps I could have made somewhat better
use of the Program if I had had a better idea of what it
would be like before I got there. I didn't know whether
it would be a rather tedious summer job or an ordinary
summer school, with scholarship.

The only particular complaint would be that
there were too many people working on our project, "Ising
Lattices." We finished a little too soon and had more
coordinating trouble than was necessary. This seemed to
be more circumstance than anything else, not likely to
occur again.

Any other faults in this experience were ours;
I feel guilty making these few comments with all the
opportunity and attention given us. I appreicated it and
will do my best to see that your program does not go so
unnoticed at Princeton this year. It is encouraging that
Princeton is finally getting a start in this area. The
University has just purchased a 7090. With my summer
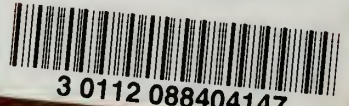experience I have a good chance of doing some programming
for it.

I am interested in the University of Illinois
for graduate work. However, beginning my junior year, I
must admit to a great amount of indecision as to my
eventual profession. Certainly, it will be in math or
physics. If it is in computing, you will definitely receive
an application from me.

I am grateful for your attention and interest.

Sincerely,

Richard Sebastian /s/